FACTORS AFFECTING HOOF BALANCE

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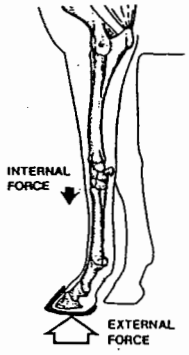
To the Students and Faculty
of Hereford College
Best Wishes,
Doug Butler 18 Mar 1992

FACTORS AFFECTING HOOF BALANCE

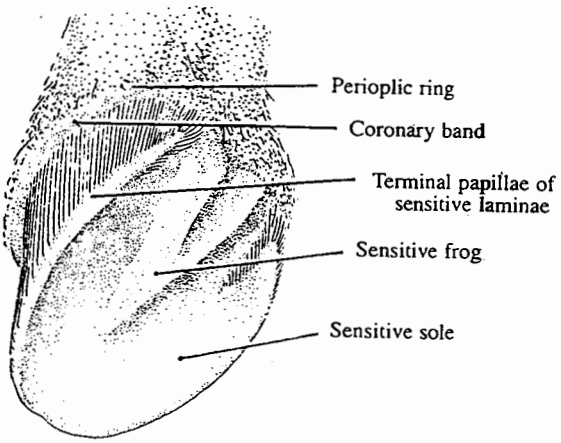
by Doug Butler

The hoof covers the distal end of the limb of the horse. It is an equalizer between the internal forces exerted by the horse and the external forces exerted from the ground. The hoof is like plastic and subject to compressive and twisting forces from an unsymmetrical stance or gait. A hoof is balanced when the forces acting upon it are in equilibrium.

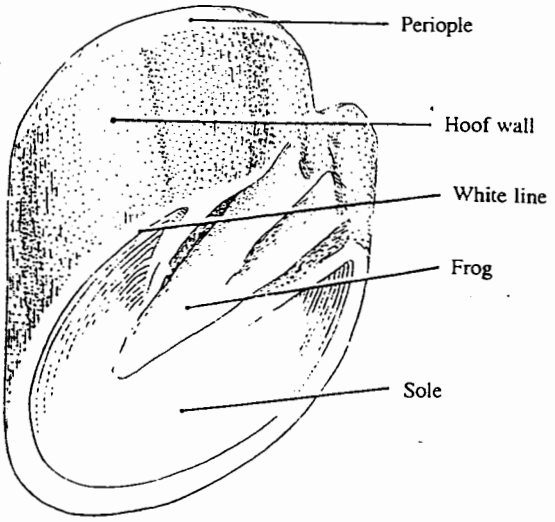


The Relationship of Sensitive Structures to Hoof Structures

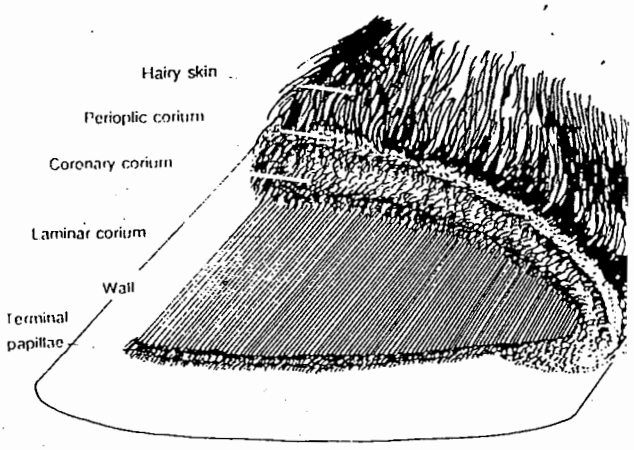
Between the unyielding bone of the skeleton and the rigid but pliable hoof is the sensitive tissue or corium commonly called the quick. The quick produces and nourishes the hoof. The hoof reflects the stresses placed upon the sensitive structures. The health of the quick determines the health of the hoof. The foot of the horse is defined as all of the structures encased within the hoof.



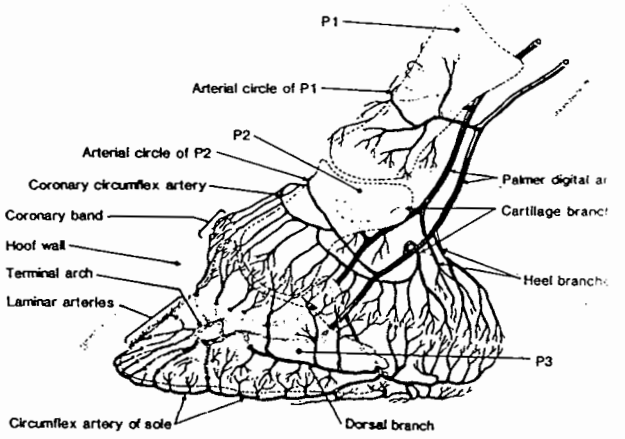
Hoof horn is modified epidermis or skin. It is produced and nourished by the sensitive dermal structures or coriums beneath it. The *stratum germinativum* overlying the coriums produces the hoof. The corium of the hoof is divided into five parts, each corresponding to the horn structure produced and nourished by its sensitive counterpart. These are: the perioplic corium - the



perioplc; the coronary corium - the hoof wall including the horny laminae; the terminal papillac of the sensitive laminae - the white line; the solar corium - the horny sole; and the frog corium - the horny frog.



Blood which nourishes the horn-producing germinal epithelial cells is brought to the foot by the paired palmar digital arteries. There are five major branches off each of the arteries that supply the foot. The first is the branch to the heel area or digital cushion. Next are branches to the lateral cartilages. The third branch is the coronary circumflex artery. The coronary circumflex and the arteries of the lateral cartilage anastomose (join) in the coronary band. Next is the branch that passes through the preplantar notch of the palmar process of the distal phalanx. The remaining major branch and principal artery passes through the plantar foraminae into the distal phalanx and anastomoses with its paired counterpart between the semi lunar crest and the circumflex or sole border of the distal phalanx. The solar corium is supplied by the arteries passing through the preplantar notch, along the parietal groove and into the circumflex artery of the solar border of the distal phalanx.



The blood supply to the circumflex artery of the distal phalanx may be compromised when weight is borne unevenly on the foot. The circulation from the circumflex artery, as well as the laminar arteries is often destroyed as

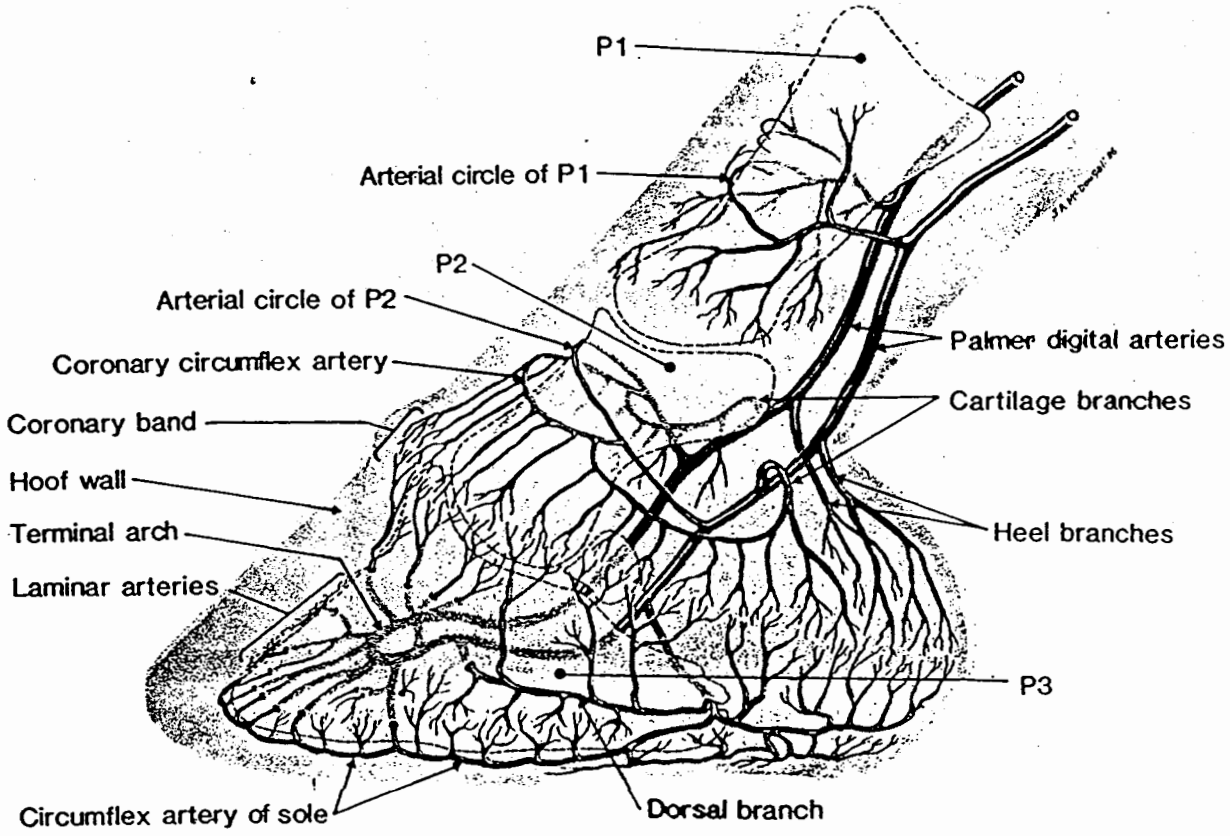
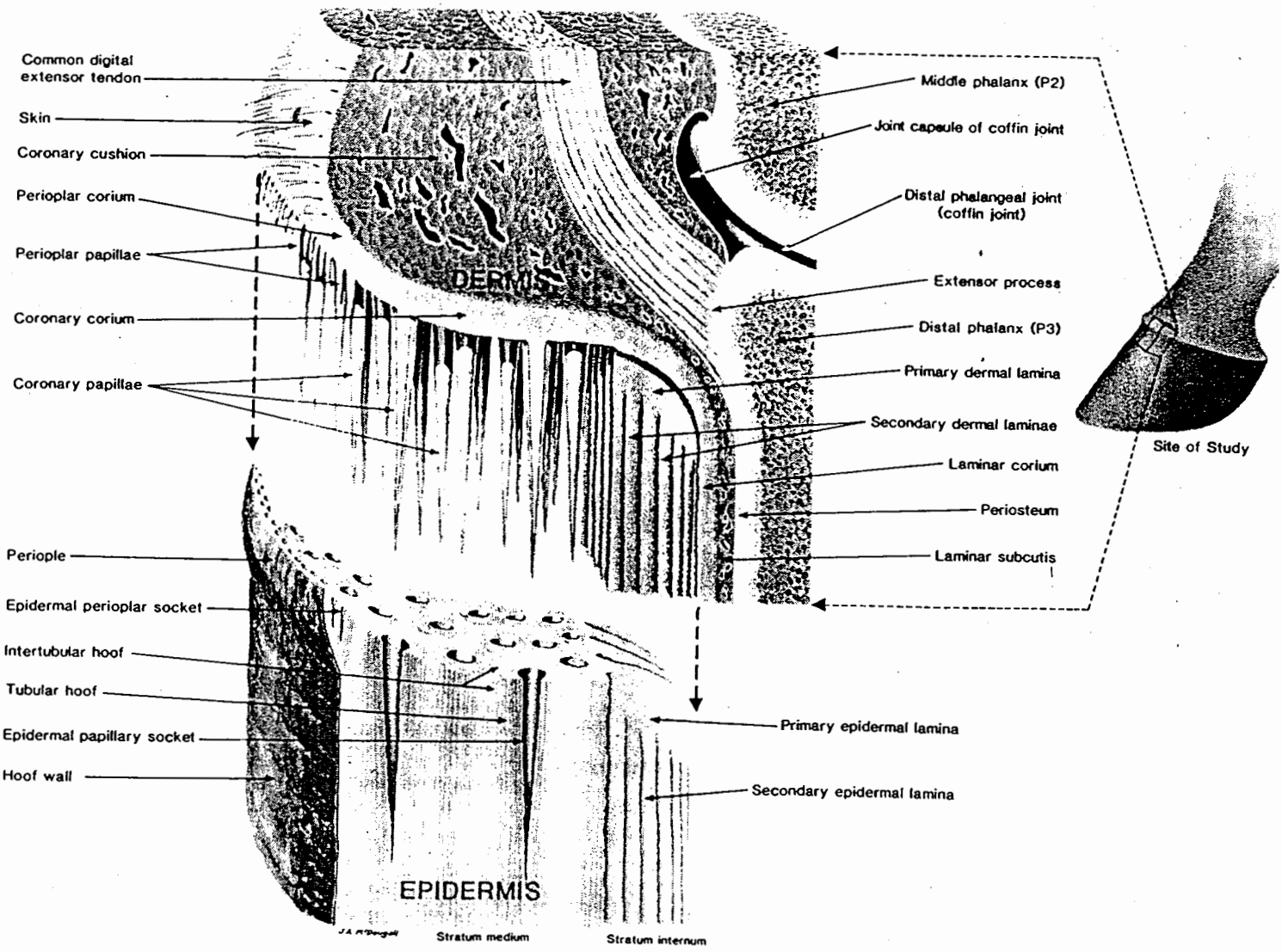
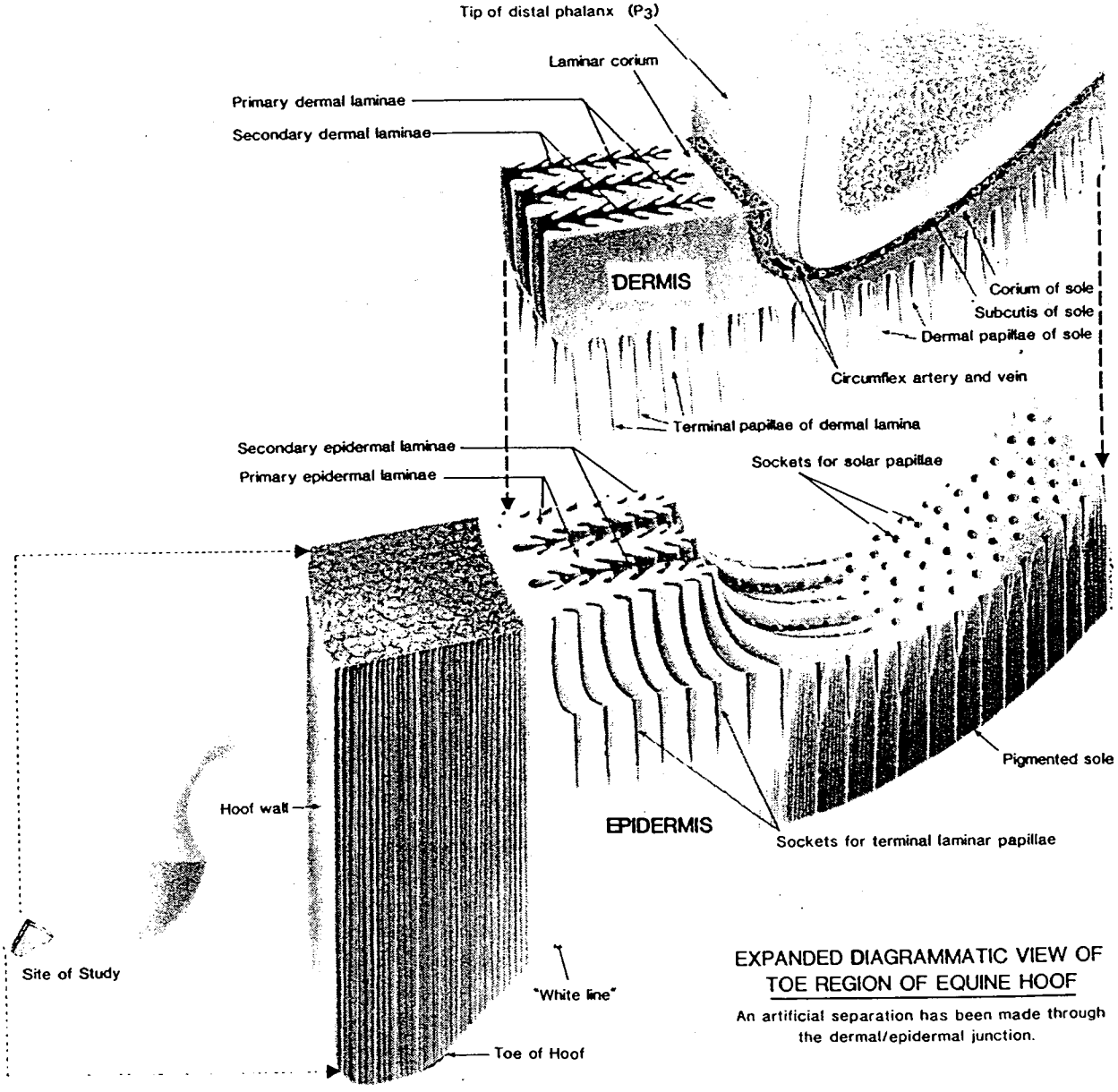


Diagram of the arteries of the equine digit. The lamellar arteries of the toe arise from arteries (themselves branches of the terminal arch) which perforate the dorsal surface of the distal phalanx. Both the coronary circumflex artery and branches of the terminal arch anastomose to supply the coronary band.



EXPANDED DIAGRAMMATIC VIEW OF CORONARY REGION OF THE EQUINE HOOF

An artificial separation has been made through the dermal/epidermal junction.



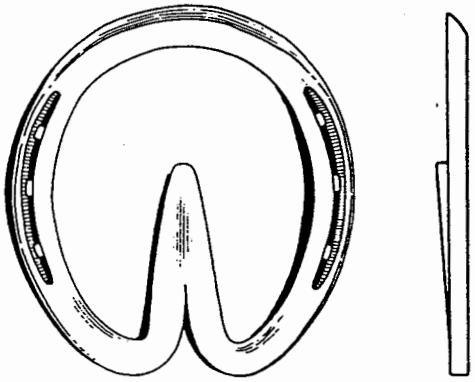
EXPANDED DIAGRAMMATIC VIEW OF TOE REGION OF EQUINE HOOF

An artificial separation has been made through the dermal/epidermal junction.

a result of laminitis due to compression of these vessels when the laminar hoof bond is no longer able to support the horse's weight.

Recently, arteriovenous anastomoses (AVA's) have been discovered in the vasculature of the coriums of the horse's foot. These allow shunting of blood from arteries to veins through AVA structures with diameters larger than capillaries. These are believed to have a role in regulating temperature in the foot, pressure modulation and in the peripheral ischemia seen in the pathogenesis of laminitis. The pain of ischemia and subsequent necrosis of tissues apparently causes further shunting.

A frog pressure support (heart bar) shoe contacting only the frog and heel hoof wall has been shown to be effective in restoring circulation to the parietal and solar surface of the distal phalanx. Thus, this shoe is effective in treating various types of imbalance as well as many cases of chronic laminitis.



Most distortions of the hoof capsule are due to conformation deformities that express themselves in the foot. Continuous uneven weight bearing on the hoof may cause uneven hoof growth and distortion of the coronary band. Generally, there is greater growth where there are greater stresses. This creates a shear between adjacent sections of the hoof wall -- eventually resulting in quarter cracks. Severe damage to the coronary corium may cause

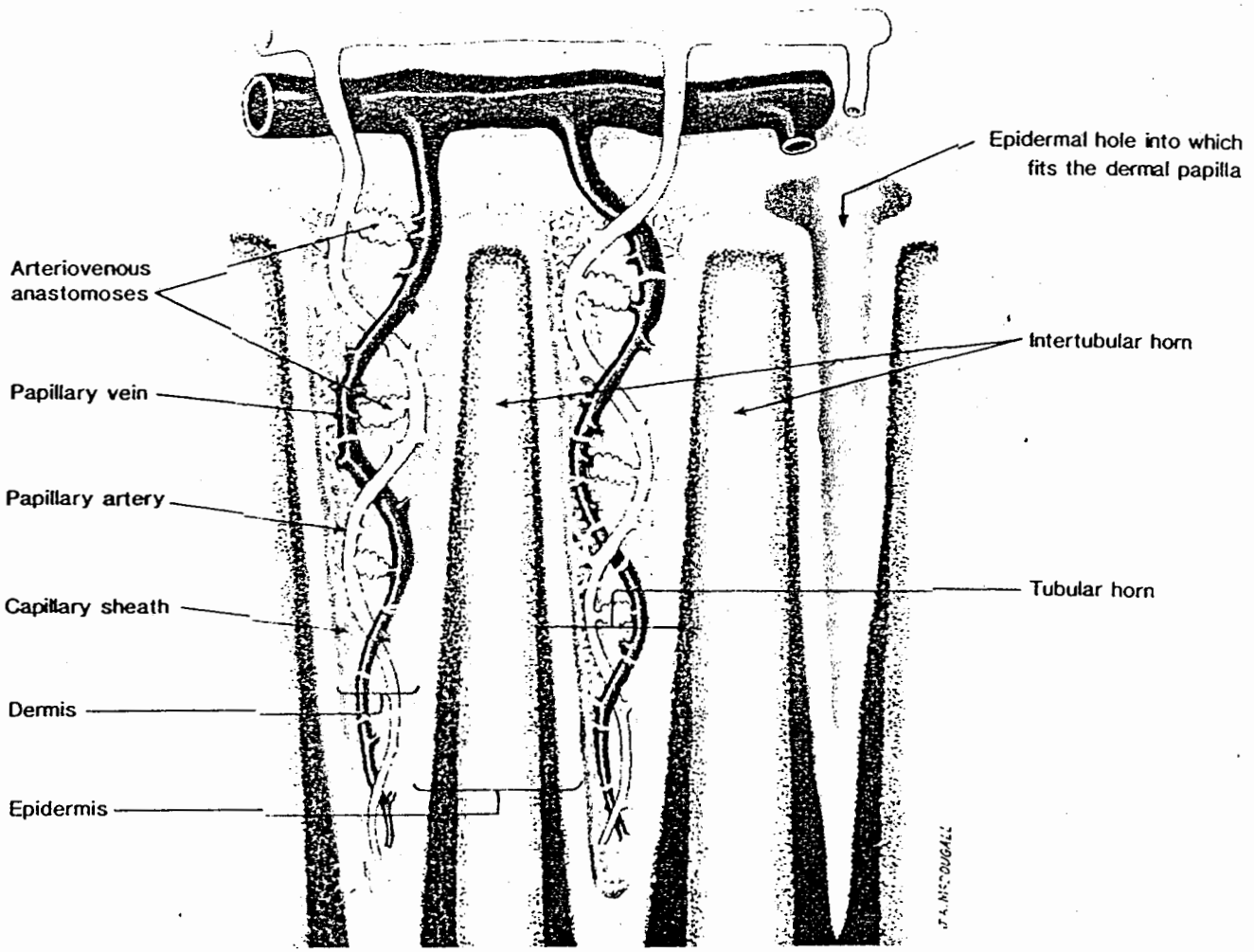


Diagram of microcirculation of equine hoof dermal papillae. Arteriovenous anastomoses connect artery to vein along the length of each papilla.
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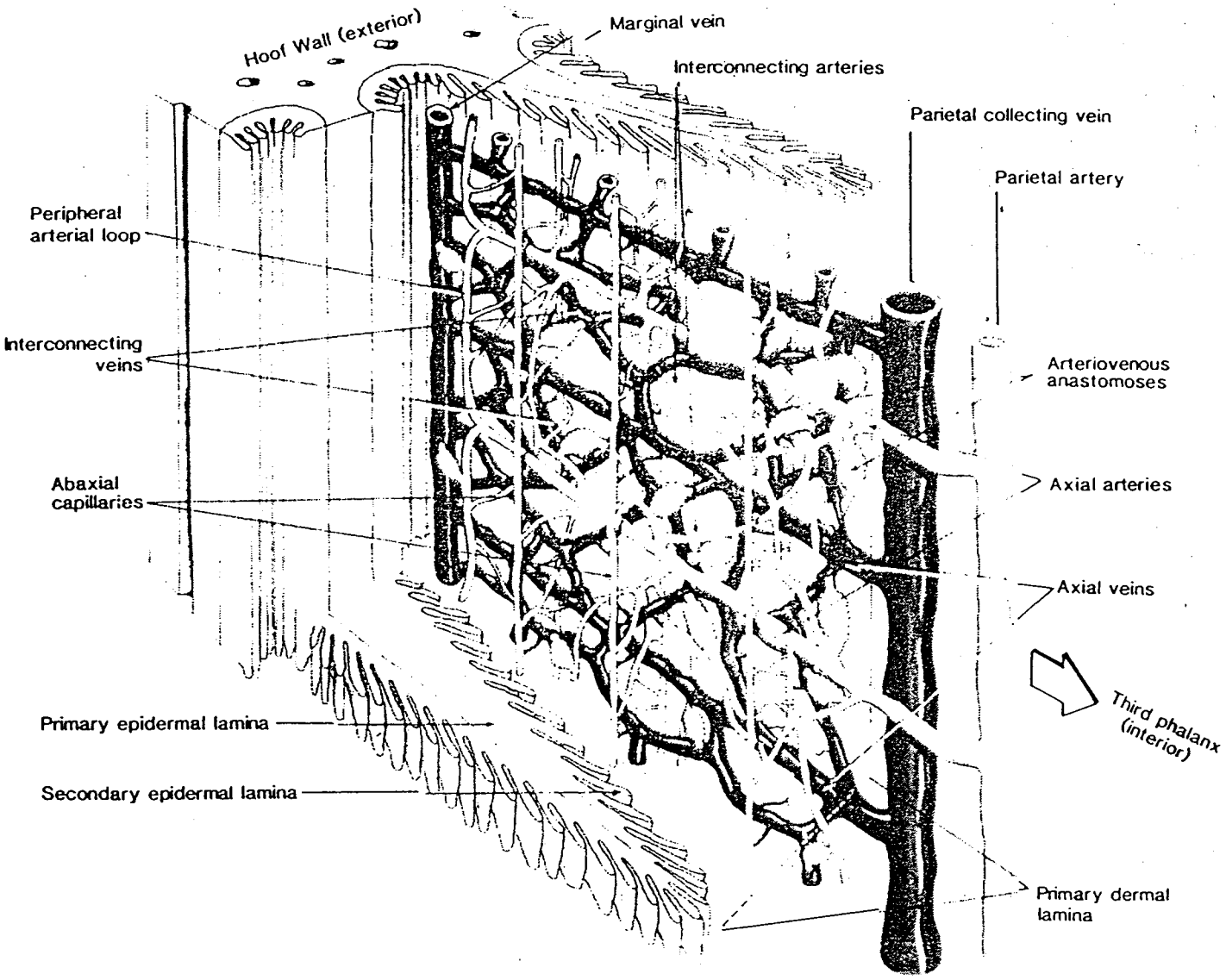
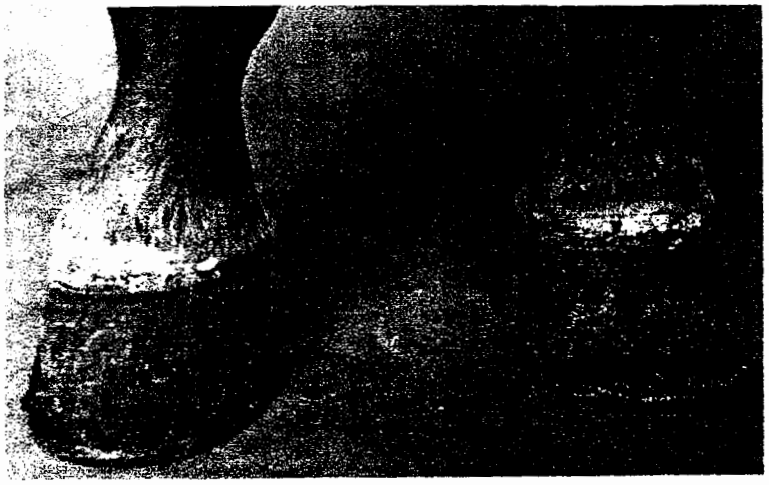
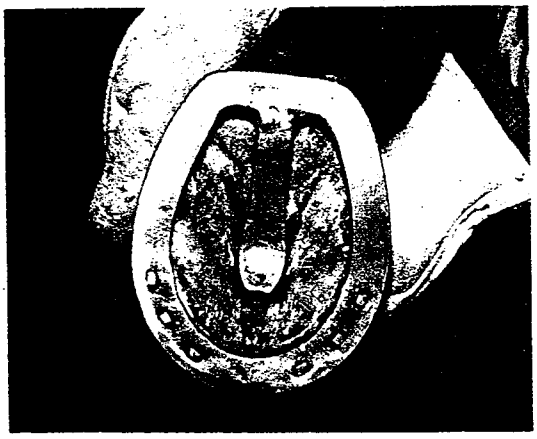
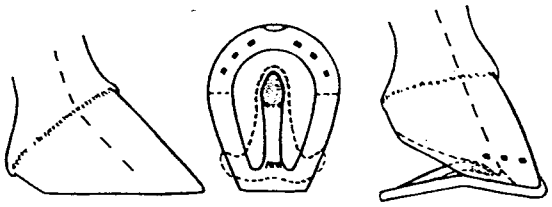

Hoof Wall (exterior)
Marginal vein
Interconnecting arteries
Parietal collecting vein
Parietal artery
Peripheral arterial loop
Interconnecting veins
Arteriovenous anastomoses
Abaxial capillaries
Axial arteries
Axial veins
Third phalanx (interior)
Primary epidermal lamina
Secondary epidermal lamina
Primary dermal lamina



Twisting of the hoof capsule due to uneven growth caused by limb deformities.





A tongue bar shoe for pedal osteitis or sheared heels. The tongue is welded to the egg bar shoe with an oxy-acetylene or electric arc welder.

The object of trimming the hoof is to improve the weight bearing on the foot and thus the posture and comfort of the horse. Where trimming and dressing of the hoof alone cannot create the desired effect, shoes are fit and applied to the bottom of the hoof.

Shoes provide protection and support for the various parts of the foot in an effort to distribute weight more evenly over the limb base. But, shoes also prevent natural adjustments of the hoof capsule. Due to the sole border rigidity of the shod hoof, changes must take place in the coronary border to accommodate unequal forces. Minor variations in shoe shape and fit influence hoof shape and eventually bone shape.

The horse's use, conformation, gait and stabling environment must be considered when shoeing. Most shoeing situations require a compromise. The above factors and others, including cost and the rider's skill, must be evaluated before deciding on a practical application of shoes.

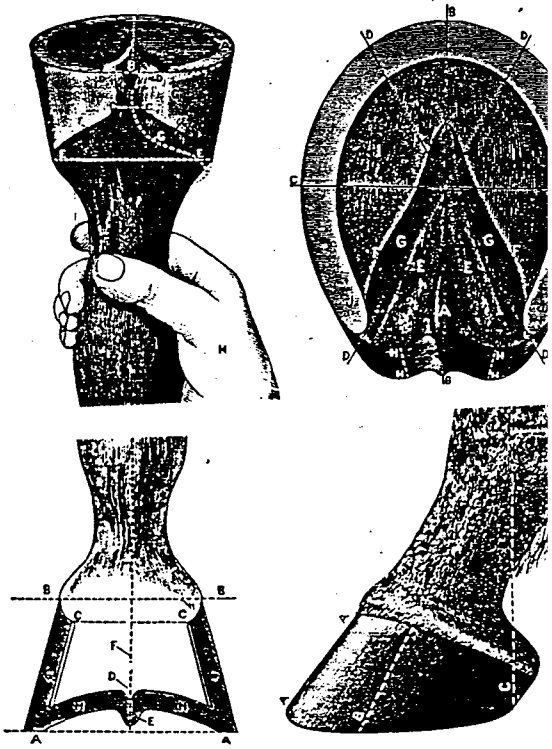
What Is Balance?

Balance implies harmony and equilibrium. When the foot is in balance it is in harmony with itself and the other limbs of the horse. A state of equilibrium is characterized by a cancellation of forces by equal opposing forces.

Geometric or static balance refers to symmetry and uniform weight distribution on the foot around the static center of gravity of the horse's limb.

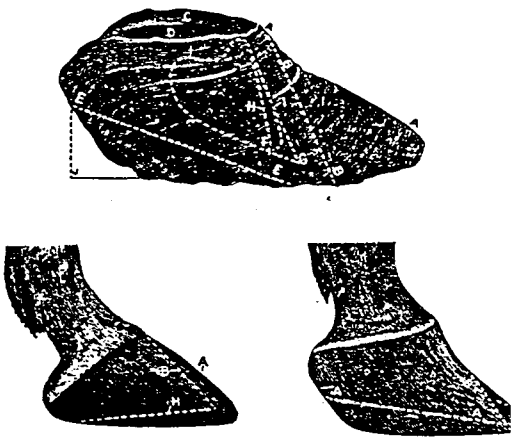
Functional or dynamic balance refers to coordination or movement of the foot in relation to the ground and the other limbs and in line with the dynamic center of gravity of the horse.

Balance is assessed by comparing the plane of the trimmed or shod hoof to various lines of reference that are square, plumb or parallel. The hoof that is presented is visually compared to an ideal. Farriers strive to create harmony and equilibrium in a deformed hoof by trimming, dressing and shoeing it. Perfect balance is rarely achieved. But, the closer one gets to the ideal, the better chance one has for maximizing performance and sustaining soundness in the horse.

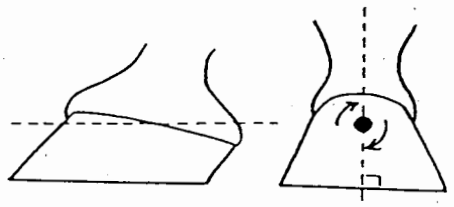


Visualizing The Ideal

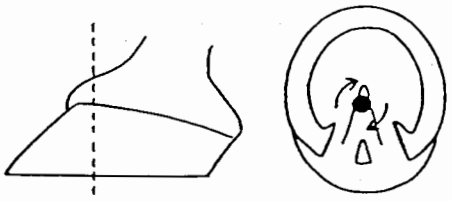
An ideal must be visualized and superimposed on the hoof that is presented. The comparison helps the farrier to see how much of the hoof needs to be removed or supported to achieve balance. Visualizing the position of the distal phalanx inside the hoof is especially important. There are six aspects of hoof balance, each compared to a point or points of reference.



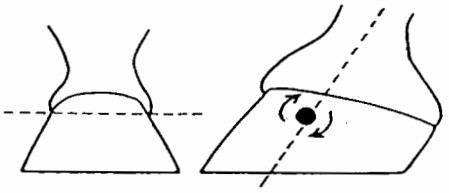
1. Medial lateral (side to side hoof wall length) - ideally, the coronary border and the ground surface are parallel to each other and perpendicular to the pastern axis. The slope of the lateral and medial hoof walls is the same.



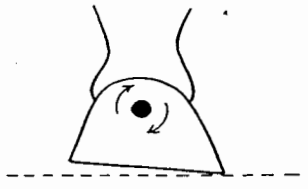
2. Hoof form or wall contour (equal radii around the toe from a center point posterior to the apex of the frog) - ideally, there is a uniform wall circumference with equal radii in the front half (front) or front fourth or third (hind) of the hoof around the end-point of the center of gravity of the limb. This point is usually 3/8" to 3/4" behind the apex of the trimmed frog, and is the location of the resultant force when a horse is moving.



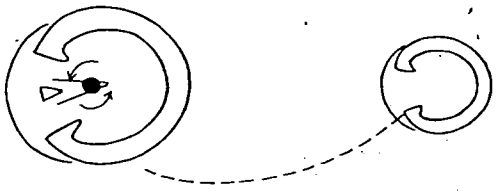
3. Toe angle (toe, heel length) - ideally, the dressed dorsal hoof toe is parallel to the pastern axis and the heel angle is nearly parallel to the toe.



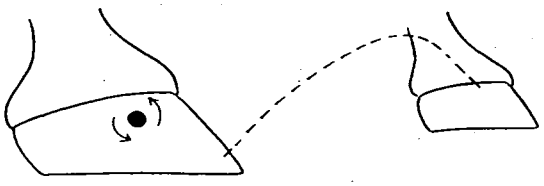
4. Hoof-ground contact (initial contact side, load bearing side) - ideally, there is uniform contact of the bottom surface of the hoof wall with the ground.



5. Hoof flight clearance (noncontact of hoof and limb) - ideally, the feet clear each other in flight.



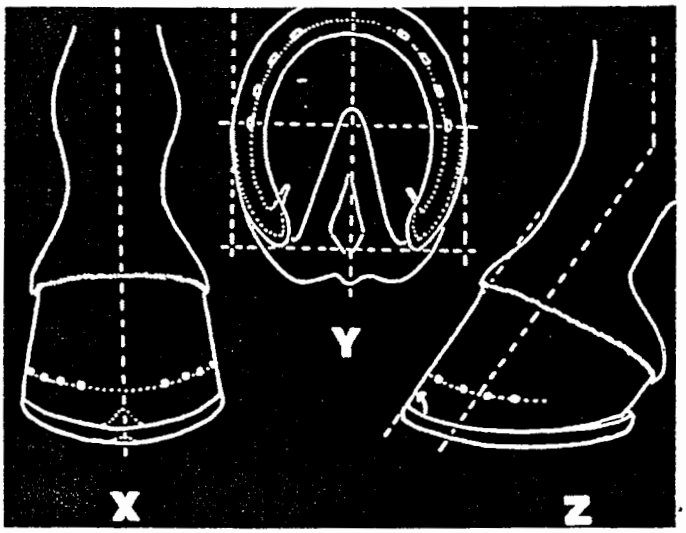
6. Hoof pair symmetry (hoof conformation and size, limb length) - ideally, hoofs are the same shape and size, fetlock angles are the same, and hoofs are elevated the same distance from the ground when moving.



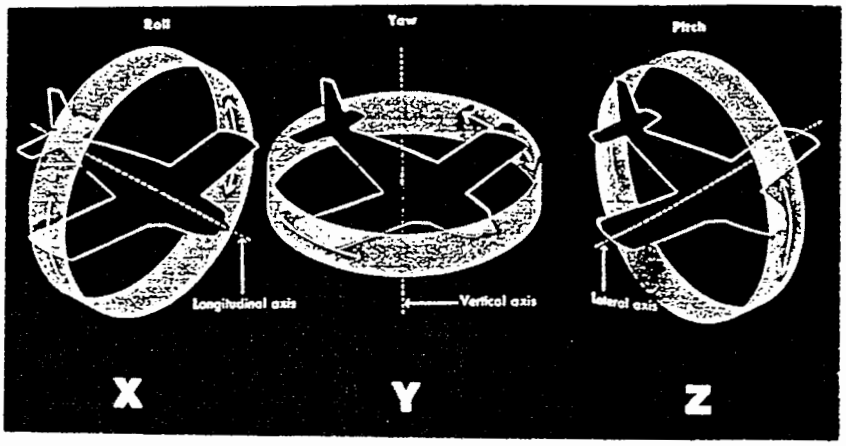
Two additional factors must be taken into consideration when trimming the hoofs. Generally, the goal of trimming is to leave the optimum horn necessary to protect the foot and obtain the performance desired.

1. Toe length is a compromise between maximum hoof length needed to prevent lameness from uneven, hard ground or as specified by breed association or horse show rules, and the minimum hoof length necessary to reduce breakover stresses and improve speed in performance horses. For many healthy horses, this means the wall will be reduced to the level of the natural exfoliating sole at the toe.

2. Sole and frog thickness is a compromise between the maximum thickness needed to protect the distal phalanx from bruising and to allow normal frog

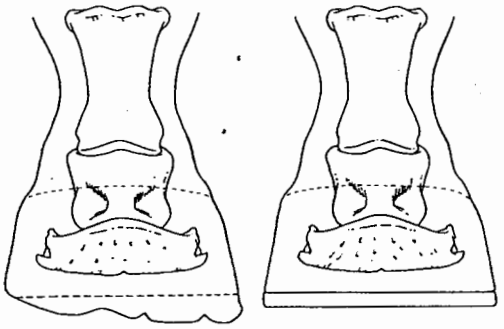


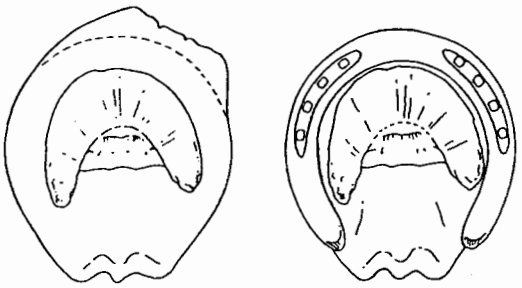
The three axes, horizontal or longitudinal (x), vertical (y), and lateral (z) are the three aspects of geometric balance.



The movements around the axes of the foot can be compared to the movements and names given to the movements of an airplane.

function and the minimum necessary to remove diseased tissue and to encourage self-cleaning of the hoof. For many healthy horses, this means no sole or frog will be trimmed. The untrimmed sole is usually the same thickness as the wall at the toe. At least this much protection is needed to protect the distal phalanx from being bruised on stony ground. Stabled horses may retain sole that would exfoliate under natural conditions. Excess sole may need to be removed from these horses. Since the frog works from within due to the descent of the pastern, it does not have to contact the ground to function in pumping blood and reducing concussion. However, the frog must contact the ground to perform its anti-slipping function. If it does not, provision for traction must be supplied in the shoe.

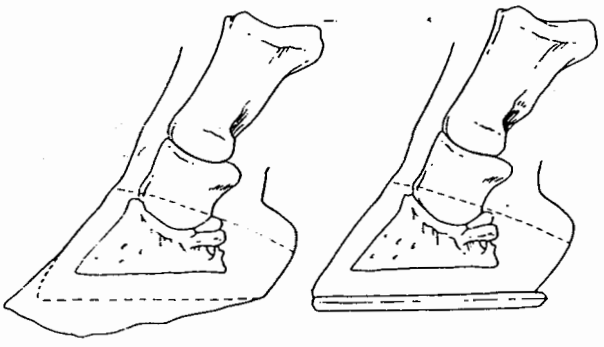




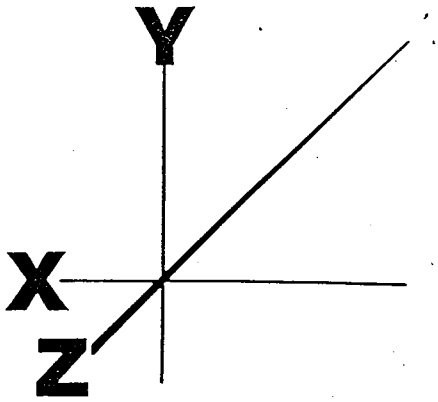
Assessment of Balance

The position of the hoof should be assessed from four prospectives. In addition, the use of the horse and its need for traction should be considered.

Distorted hoofs should be trimmed for geometric balance first. This will take care of the needs of most horses with good (close to ideal) conformation. Further evaluation will be necessary if the horse has poor (deviates

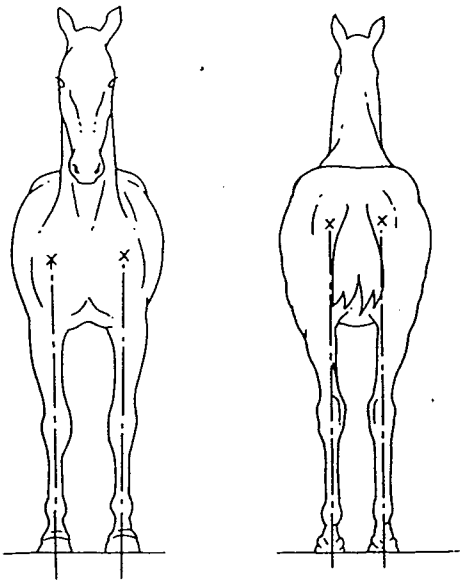


from ideal) conformation and there is a deformity in one or more of the lower joints or limb bones. After the hoof is dressed geometrically, the shoe is fabricated and adjusted to fit the limb conformation and movement of the foot. Viewing from ground level is often helpful. Each limb and foot should be assessed separately. Then, they should be looked at as a part of a pair and finally as a member of a quadrapedic unit.

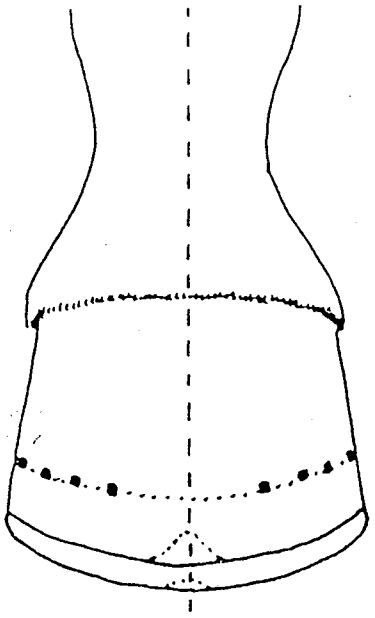


The four prospectives with guidelines to be assessed are:

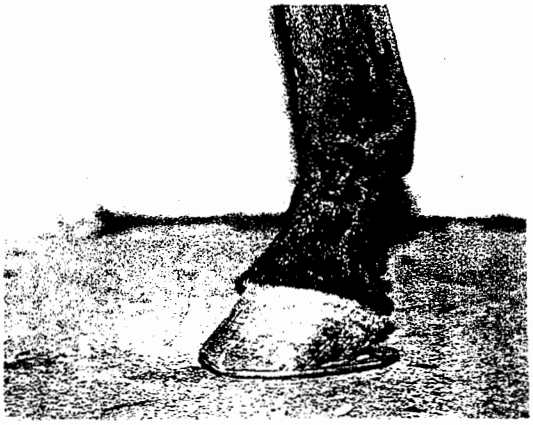
1. Position of the foot in relation to the limbs' center of gravity or axis (three dimensions - corresponding to the x, y and z axes).

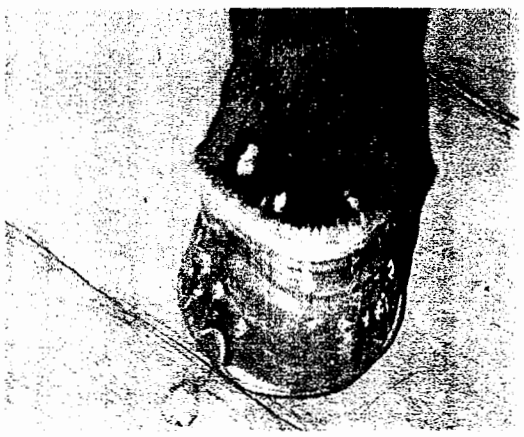


From the front, the center of gravity of the front limb of an ideally-conformed horse is a plumb line from the point of the shoulder, bisecting the extensor process of the distal phalanx and the hoof base. From the rear, the center of gravity is a plumb line from the point of the buttocks, bisecting the hoof base. The axis of the pastern is perpendicular to the plane of the bottom of the distal phalanx in an ideal horse. The side(s) of the hoof may need to be dressed (shaped) with the rasp to create a base with equal sides and slope, in addition to trimming the ground surface of the



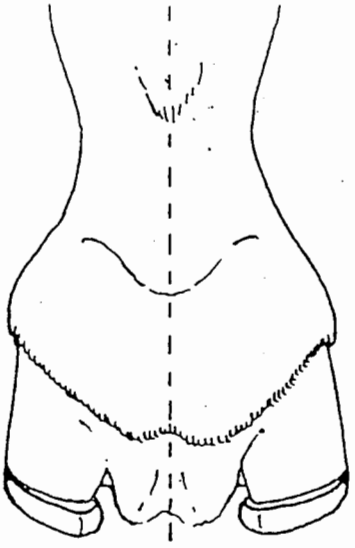


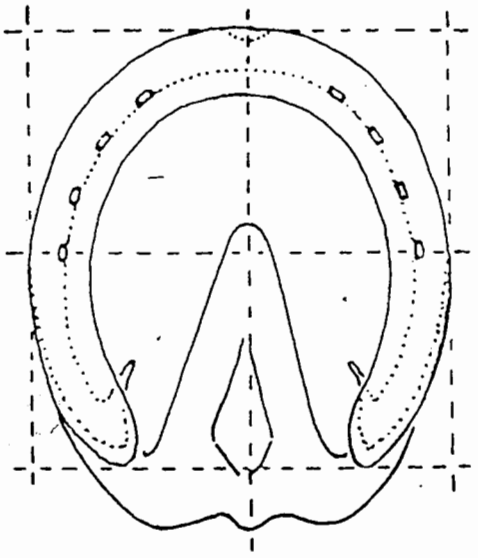


Examples of before and after restoration of medial/lateral, toe/heel and hoof form balance.

hoof with the nippers. A T-square or gauge may be used to help visualize the ideal. This is referred to as medial/lateral balance.

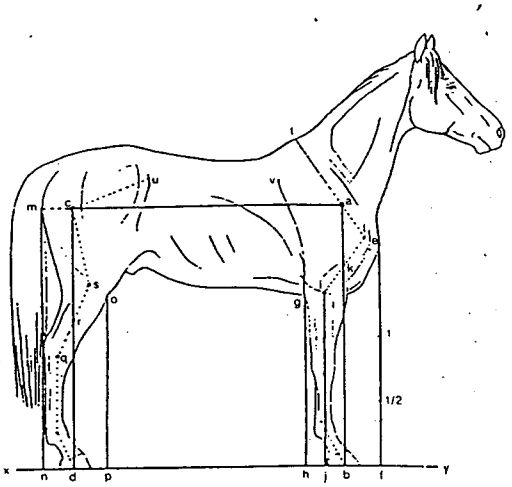


From the hoof bottom, the center of gravity of the limb of an ideally conformed horse may be identified by an imaginary point. The vertical axis of the distal phalanx, the center of the insertion of the deep flexor tendon, and the resultant force at the walk and trot, is under this point. It is 3/8 to 3/4 inch back of the apex of the trimmed frog. This point can be used to guide the shaping of a distorted hoof and the fitting of the shoe's form, width and length. An imaginary or transparent plastic square can be used to visualize the trimmed foot and to aid in fitting the shoe. The circumference of the hoof may need to be shaped (dressed) to a symmetrical form with the rasp. A compass or ruler is useful in helping one to visualize the ideal proportion and symmetry of the hoof. This is referred to as hoof form balance.



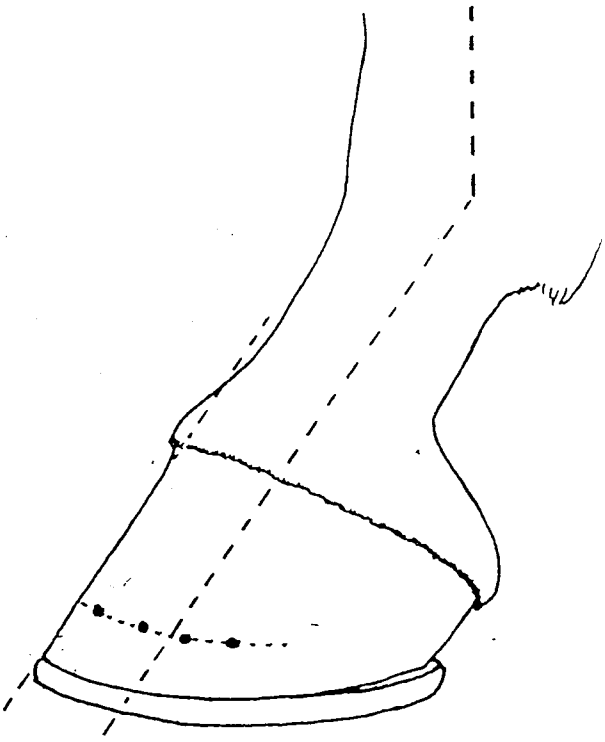
From the side, the center of gravity of the front limb of an ideally conformed horse is a perpendicular line dropped from the center of the scapula through the joint space behind the extensor

process of the distal phalanx just in front of the axis of rotation of the distal phalanged joint bisecting the hoof base. The center of the scapula is the point of suspension of the front limb by the serratus ventralis muscle. The perpendicular passes through the center of the insertion of the deep flexor tendon under the distal phalanx. In the hind limb, the center of gravity is a perpendicular line dropped from the articulation of the hip just in front of the axis of rotation of the distal phalangeal joint through the center of the insertion of the deep flexor tendon, bisecting the hoof base.

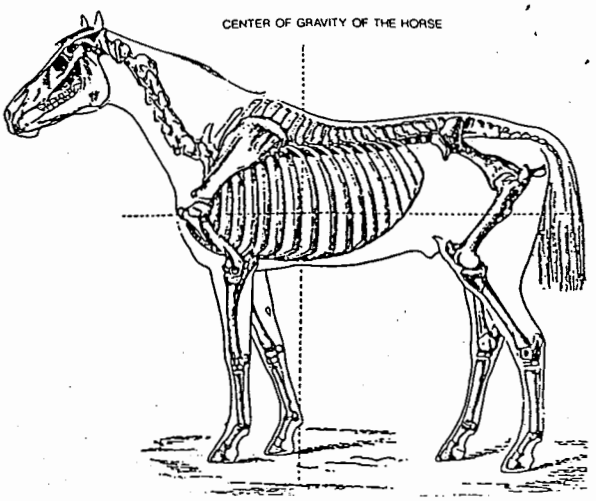


Lines of equilibrium of the horse viewed in profile.
Reproduced from a photograph of M Delton.

Ideally, the axis of the pastern is parallel to the dorsal mid-toe border of the distal phalanx in both front and hind feet. The base of the distal phalanx normally forms an angle of 5 to 10 degrees with the hoof base. The dorsal toe of the hoof may need to be shaped or dressed with the rasp in addition to the trimming of the bottom or ground surface of the hoof with the nippers to establish an ideal angle of the hoof toe that is parallel to the pastern angle. A steeper hoof angle usually puts less stress on the structures of the foot including the deep flexor tendons. Hoof angles can be measured and compared with a hoof protractor. This is referred

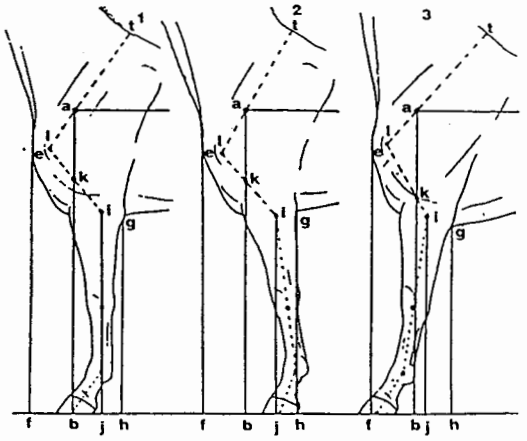


to as toe/heel balance.

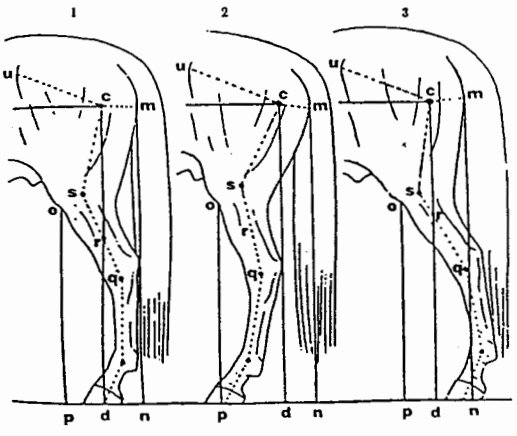


2. Position of the foot in relation to the horse's center of gravity (limb conformation).

The center of gravity of the standing horse is at a point behind and above the elbow in the center of the body. From the side, this point is near the outer edge of the bend of the eighth rib.



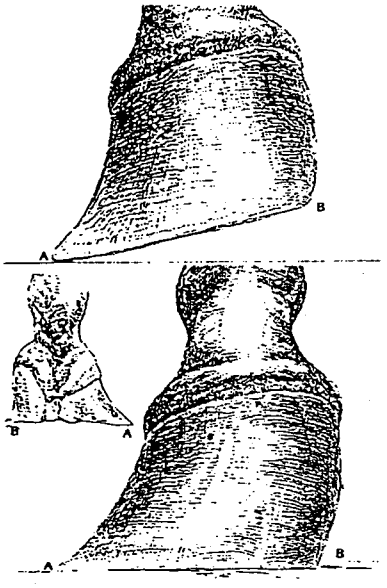
Each of the limbs also has a center of gravity. Ideally, the foot is under the limb's center of gravity. In horses with less than ideal conformation, the foot may be placed ahead of, behind, or on either side of the center of gravity. An imaginary plumb line from the point of attachment of the limb on the body will aid in determining the degree of deformation of the limb and assessing the distance of the foot from the center of gravity. The object of trimming and shoe design is to create a more uniform weight distribution over the foot by moving the base of support closer to the center of gravity. It is usually not possible to completely overcome the effects of conformation but small changes often make big differences. The closer the base of support



corresponds to the center of gravity, the more chance there is for a healthy quick and foot.

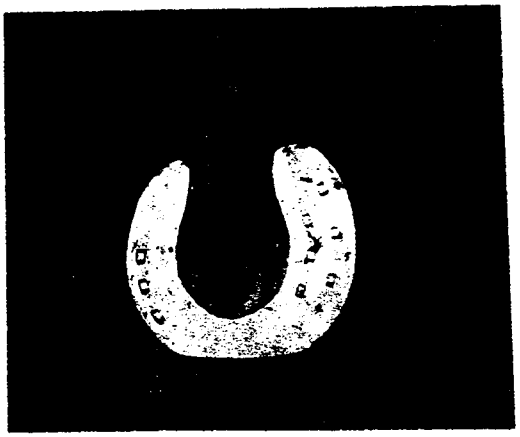
3. Position of the foot in relation to ground contact (foot fall) when moving at the performance gait and viewed from in front or the rear. Toe and heel loading depends on the gait. The foot may hit flat at the trot, but usually toe first at the walk and heel first at the gallop.

Ideally, the foot meets the ground flat from side to side. It does not touch the ground on one side and bear weight on the other side. The contact side will distort and become concave or flare out, the weight bearing side will distort and become convex and shear at the heels due to the overall distortion of the hoof capsule. Horses with conformation defects will have uneven foot fall. Over time, this will distort the hoof capsule and may lead to lameness. Trimming the foot so it lands flat, after the other aspects of balance have been considered, may be appropriate to increase the longevity of these crooked-legged horses. However, geometric balance should be considered first. Most horses spend more time per day standing than they do performing. However, forces on the foot are



A toed-in foal shod with glue-on shoes. The lateral extension are filled with acrylic plastic to prevent them from being treaded off.

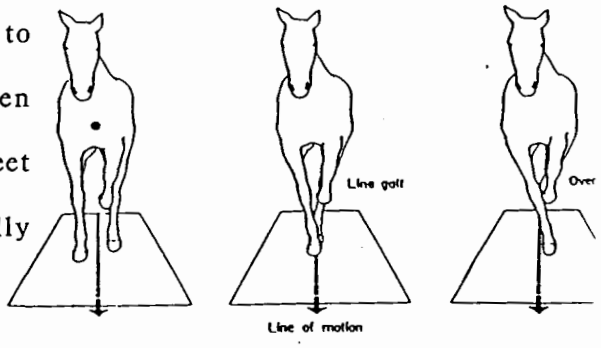
A base-wide, knock-kneed foal shod with medial extension shoes forged from aluminum. The medial extensions are filled with acrylic plastic to prevent them from being treaded off.



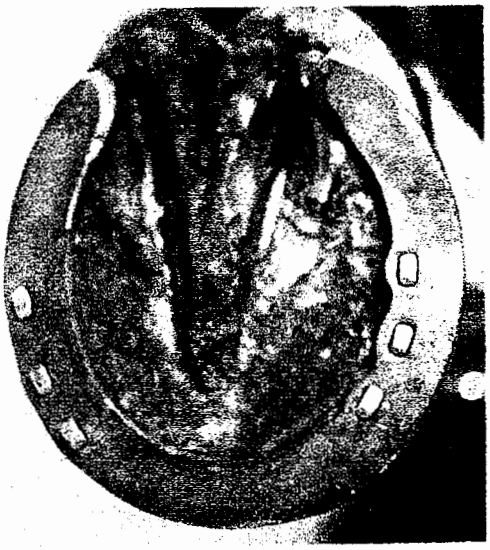
greater when the horse is performing at the faster gaits.

Frequently, a compromise is necessary between what is called for to satisfy geometric (static) balance and what appears to satisfy the functional (dynamic) balance requirement. The ligaments and gliding joint surfaces of the distal interphalangeal joints are designed to accommodate small differences. The limbs naturally swing in over the center of gravity as the horse moves.

Lameness can usually be prevented by avoiding extremes. Over-lowering of one side of the foot to "make it land flat" may cause over-crossing when the horse is moving. Also, the position of the feet when the horse is standing may not be visually acceptable to the horse owner.



Great judgement must be used when working on young horses that are still growing and not confirmed in their gaits. Weight bearing, not wear, causes hoof deformation. Lateral or medial shoe extensions are more effective than trimming or wedging the hoof out of geometric medial/lateral balance. The shoes can be nailed on or glued on.



A Quarter Horse with base-narrow, toed-out conformation, shod with shoes punched course on the outside and fine on the inside to place the shoe closer to the center of gravity of the leg. The left leg is viewed from above to get prospective on dressing the hoof.

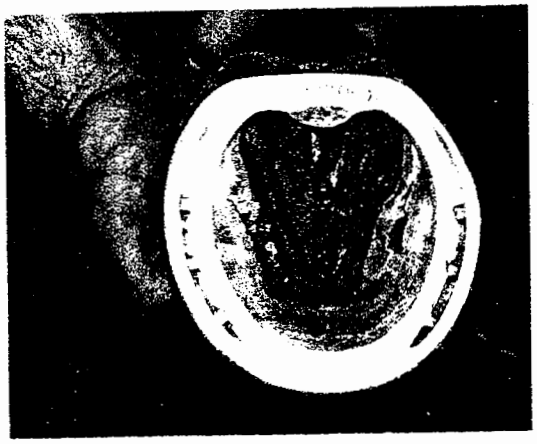
4. Position of the foot in relation to other feet (foot flight arcs and possible limb interference).

Limb interference or lameness due to incoordination or unbalanced weight distribution requires "corrective" or "therapeutic shoeing" (surgical shoeing). It may involve the consideration of factors within a limb or between limbs. Limbs and feet may be of unequal size. The spreading flat and wide foot will usually be on the long limb. The contracted, upright and narrow foot will usually be on the short limb. Long standing lameness or birth defects may also cause differences in corresponding hoof sizes and shapes. Temporary or permanent changes in weight distribution over the foot may be necessary to restore soundness. Changes in gait timing by training and conditioning as well as changing trimming and shoeing methods may be necessary in these cases.

Common Problems Caused by Imbalance

Distortions of the hoof capsule such as flares, sheared heels, quarter cracks and posterior heel lameness are the result of imbalanced hooves. Most of these conditions can be remedied by bringing the foot into

A Thoroughbred race horse with mis-matched feet. The toe was dressed back and a fullered aluminum bar shoe was applied to the foot with collapsed heels. The horse raced sound.

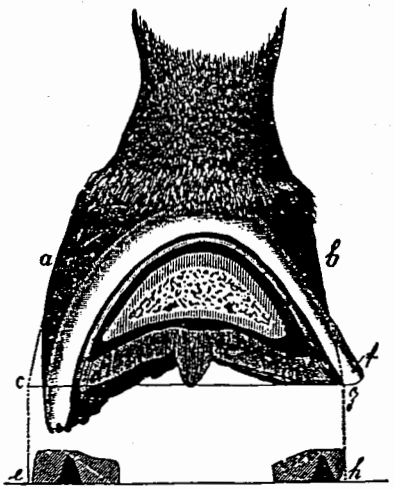


Egg bar shoes with an aluminum wedge applied to a lame dressage horse with unequal leg length. The horse became sound.

Sheared heels on a horse with severe multiple limb deformities.

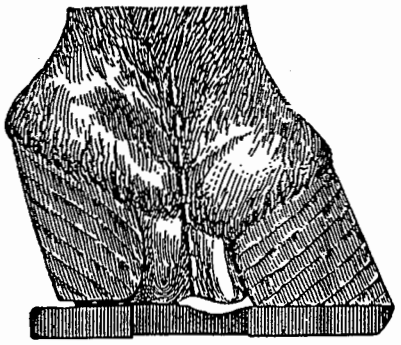
balance or equilibrium. When the condition has progressed to lameness, special shoes may be required. Following are common deviations from the ideal, sloping hoof wall that is produced by a healthy quick. Examples of treatments for these conditions are included.

1. Convex distortions of the horizontal coronary border of the hoof capsule, called sheared heels, usually resulting in a convex hoof wall surface on the high or sheared side.



A crooked right fore-hoof of the base-wide position: *a*, convex wall, too high; *b*, concave wall, too low; *c d* shows how much of the outer wall must be removed with the hoof-knife; *f*, superfluous horn to be removed gradually with the rasp; *c e* and *g h* indicate the position of the shoe with relation to the hoof.

When viewed from the rear, the hoof capsule will appear twisted with the coronary band border and sole border or ground surface not parallel. The hoof tubules become bent and the hoof becomes distorted. There may be soreness in the central sulcus region or in the laminae at the heels. Sheared heels are the result of unequal weight bearing on the hoof equalizer on the end of a crooked limb. A decision must be made to determine which is more tolerable, stress on the joints or stress on the hoof. This decision is usually made based on which area hurts at the time. If the foot has pain in it, the effort is usually directed toward lowering the long side of the hoof to get the capsule back to a near normal shape. The foot

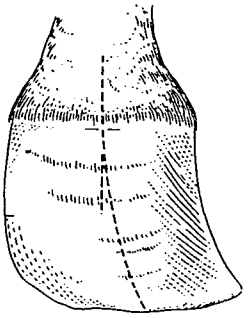


A wry right front foot of the base-wide class, viewed from behind. The bar shoe is fitted full along the contracted inner quarter, and snug on the outside. The inner branch of the frog rests upon the bar of the shoe; the outer branch is free. The inner quarter from the last nail back to the frog is free of the shoe.

needs to be moist and pliable to do this. If the joints have pain in them, the hoof is trimmed and/or shimmed up and supported until the foot lands flat from side to side at the horse's performance gait. A frog pressure shoe that removes weight bearing from the sheared side of the foot is often helpful. Feet on the end of crooked limbs that are not sore can be kept sound by shoeing with geometric balance and by moving the clip or nails to help the horse appear straighter.

2. Distortions of the vertical hoof capsule producing a concave surface called lateral or medial flares. Quarter cracks at the sole border may occur in barefoot horses that are not routinely trimmed and kept "collected" (flares removed) and rounded on the edges.

When viewed from the front, the hoof capsule will appear dished or flared out. The wall hoof tubules bend and the hoof becomes distorted. These distortions of the hoof capsule can be safely reduced by dressing or rasping the outside of the wall by no more than one-half its thickness. Veterinary assistance, including radiographs, is called for when it appears that a significant



Rough untrimmed foot

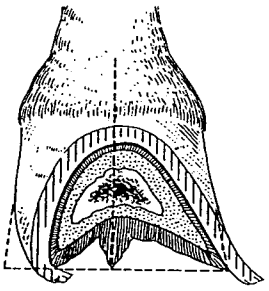
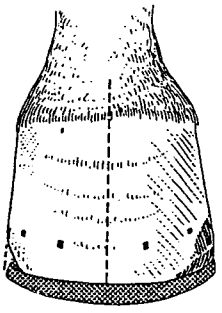
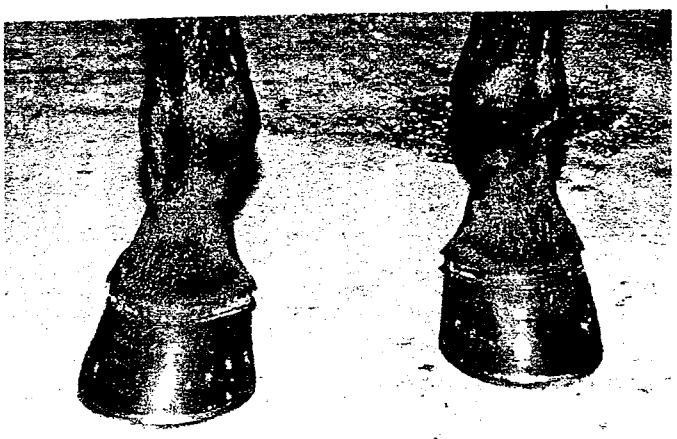


Diagram of trimming



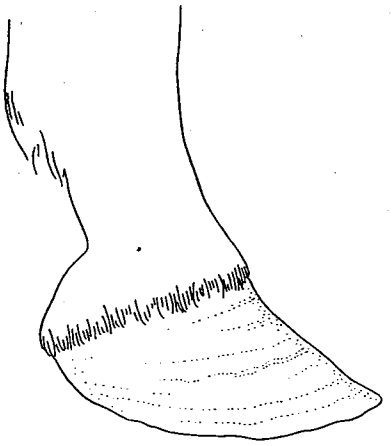
Trimmed & shod

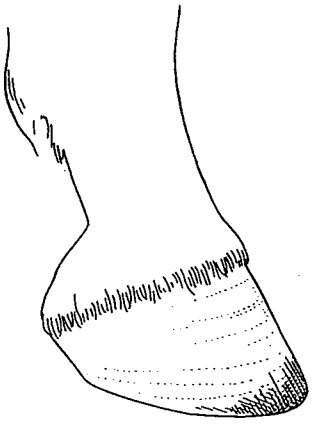


Shoeing for a very crooked Quarter Horse by moving the position of the nails and set toe to make the deformity appear less obvious.

Shoeing for a very crooked Clydesdale horse by moving the position of the clip and nails to make the deformity appear less obvious.

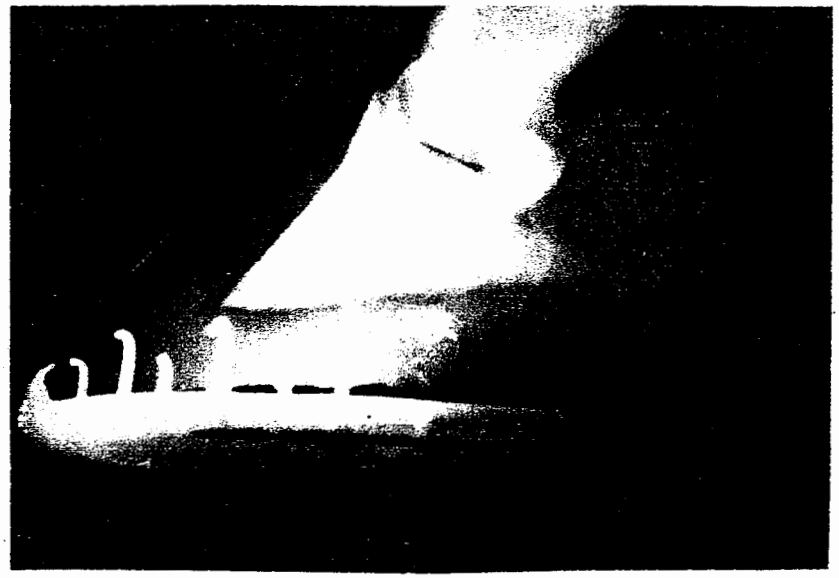
amount of hoof dressing is necessary. The hoof dressing should occur no more than one-half to two-thirds of the way up the wall. The front half of the hoof should be shaped in a round manner to match the circumference described from the center of gravity of the lower limb. The position of the distal phalanx must be kept in mind as the hoof is shaped. The corium or quick remodels slightly as weight bearing is shifted upon it. After dressing or shaping the hoof, the shoe should be fit to get its center as close as possible to the ideal center of gravity of the limb. Over a period of time as forces are equalized, the hoof will begin to grow uniformly and distort less and less between the interval of shoeings.



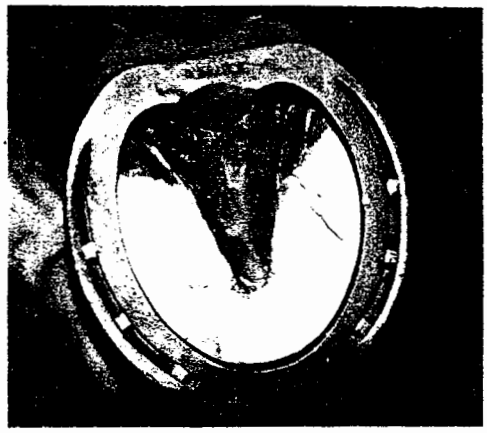


3. Distortions of the heel and quarters of the hoof capsule, called collapsed or run-under heels, resulting in quarter cracks at the coronary border. A steep pastern usually produces a concave or dished toe. A sloping pastern usually produces a convex or bull-nosed toe.

When viewed from the side, the hoof capsule appears run under at the heels. This condition is commonly caused by shoeing too short in an effort



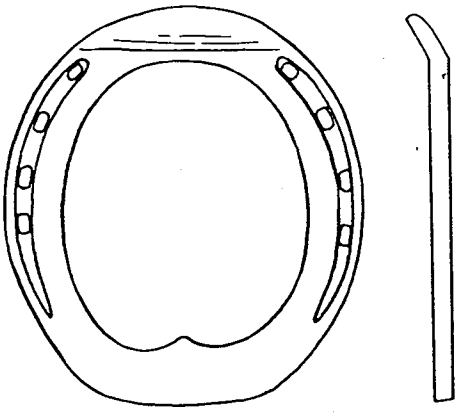
Radiograph of neglected foot with short shoe showing a greater proportion of weight on the heels can crush them and cause increased stress on the deep flexor tendon and navicular bone.

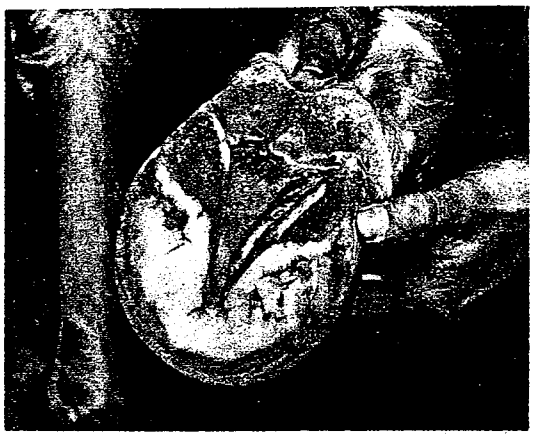


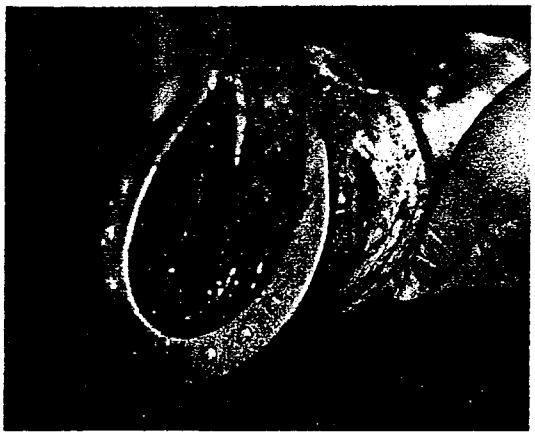
Egg bar shoes with set toes applied to a horse with navicular disease. This horse is worked in deep ground and therefore the shoes do not project back to the bulbs.

Egg bar shoes with set toes applied to a horse with navicular disease. This horse is worked in firm ground and is short-strided enough that it will not pull the shoes off.

to prevent lost shoes and/or by neglecting horses and allowing the hoof to grow to an excessive length which pulls the shoe toward the toe. The hoof wall tubules are bent due to excessive weight bearing on the heel. The hoof wall is stressed at the coronary border in the mid-quarter region. Cracks will appear where the tubules are pulled apart at their coronary surface. Cracks into the sensitive tissue will cause lameness. Distortion of the hoof capsule may cause the toe to be dished or bull-nosed. The heel of the foot should be supported by extending the shoe heel, and the toe should be dressed back to place the shoe farther back on the foot. An egg bar shoe helps to support the foot and restore a more equitable weight distribution over the foot. Cracks that are open and bleeding may be helped by transferring pressure from the wall at the affected quarter to the frog with a frog support bar shoe. This will improve the circulation to the coronary band and wall and help to stabilize the crack. A steel plate and screws can be used to bind the crack, acrylic plastics can be used to fill the crack. Infected cracks should not be filled. Repair of the crack with patches of various types is usually not effective without remedying the imbalance and

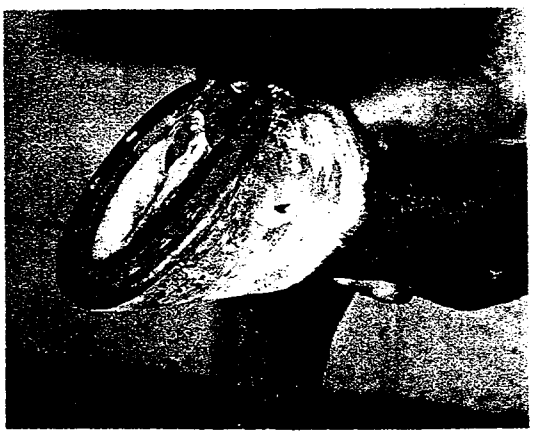




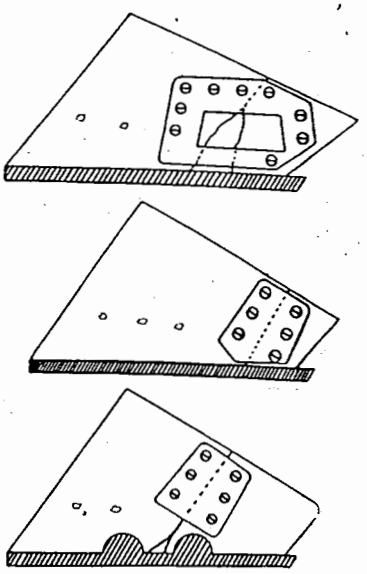


Horse with short foot putting excess pressure on heels causing a bleeding quarter crack and lameness. A long heeled shoe was ineffective. The addition of a frog support to the shoe allowed the crack to heal and the horse to return to soundness.

Quarter crack caused by sheared heel (note pushed up coronary band) laced with wire and filled with acrylic; shod with frog pressure bar shoe to transfer pressure from affected quarter to the frog.

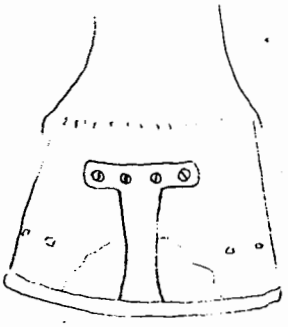


resulting stresses that created the problem.

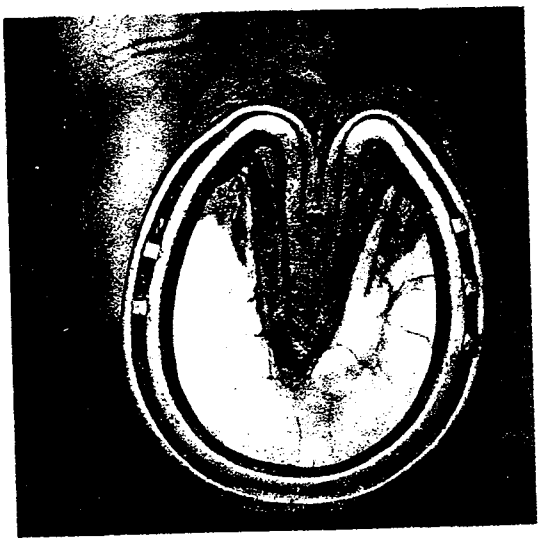


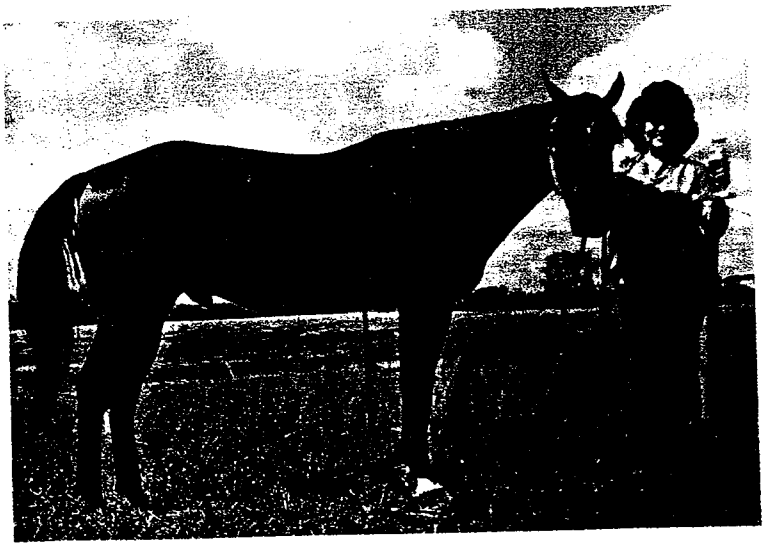
4. Distortions of the toe and white line of the hoof capsule resulting from chronic laminitis.

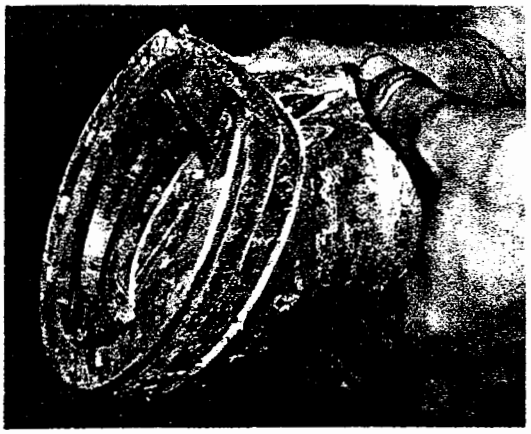
When viewed from the bottom, the hoof capsule appears to be distorted forward when compared to its normal position in relation to the apex of the frog. The white line appears wider than its normal width of 1/8 inch. The hoof capsule has changed shape due to the presence of the wedge of laminar scar horn. The shoe should be fit to the shape of a normal hoof and aligned under the distal phalanx. The center of gravity point and the bulbs of the heels can be used as points of reference to determine this alignment. The shoe is nailed on using the heel nails. The excess toe can then be trimmed off and the wall and laminar wedge rasped down to fit the shoe. Eventually, the laminar wedge of scar horn will grow out as balance is reestablished and the injured tissue is replaced by a regenerated corium. Shoes can be held away from the toe that may have abscesses or missing horn by a large T-clip welded on the toe of the shoe that is then attached to the wall above the injury with screws.



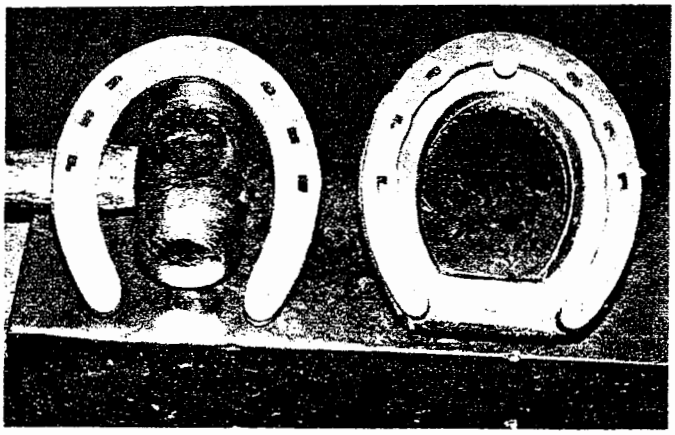
A Quarter Horse had severe laminitis with abscesses in the toe. In eight months' time, it grew a new hoof and became completely sound. Heart bar or frog pressure shoes were reset monthly.



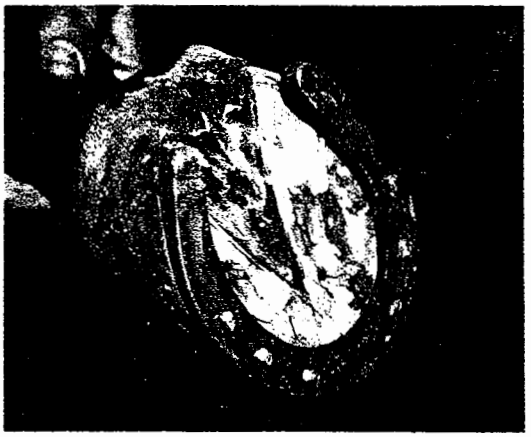




A build-up consisting of a double-nailed pad and wedge put on a lame Quarter Horse. The shoe and pads on the left foot equal the weight of the shoe on the right foot.



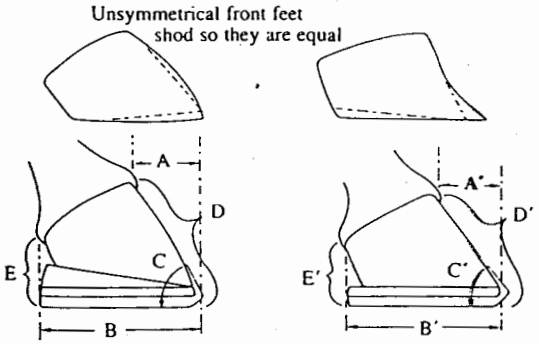
The next shoeing, the pads were removed, the growth left untrimmed and a shoe with swelled heels was applied. The other foot was trimmed the normal amount.



Finally, both feet were shod with plain shoes of equal weight. The left foot was left much longer than the right. The horse became sound and became a top competitor.

5. Distortions of the entire hoof capsule due to unequal limb length.

When viewed from the front and from the side, the feet appear to be of unequal size and conformation. When viewed from the side, one of the opposite feet appears high in the heel, the other appears low. The short limb (usually the one with the small foot) can be built up with wedges until the hoof grows out to a length that appears comfortable and will maintain the soundness of the horse. These horses may be sore on one or both feet. Horses with this condition can be identified by observing them on a level floor. The chestnuts will often appear at different heights. The medial malleoli of the radius (above the knees) will not be even. The top of the withers will not appear to have a uniform curvature and the dorsoscapular cartilages and ligaments will be of unequal height when viewed from the rear. The rider will often complain of uneven gaits or that the horse works better one way than the other. There will often be a white spot or sore on the shoulder of the longer limb where it rubs the saddle. When the short leg is built up to the correct length, the shoulders will be level, and they will be balanced. Each case must be individually considered.



A, B, C, D & E should equal A', B', C', D' & E'.

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